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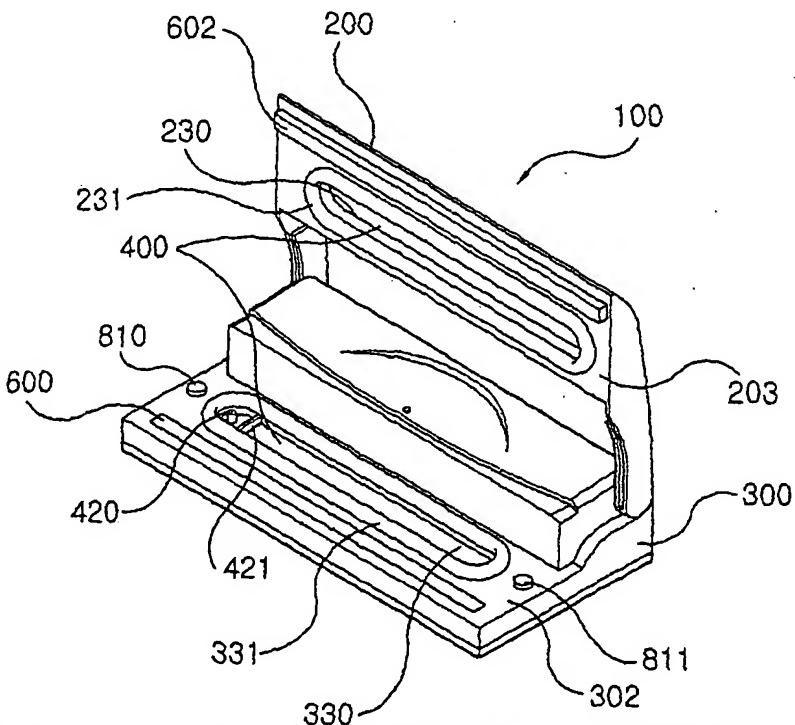
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*[Continued on next page]*

(54) Title: APPARATUS FOR VACUUM PACKAGES AND METHOD OF CONTROLLING IT



(57) Abstract: Disclosed is an apparatus for vacuum sealing a plastic bag and/or container and a method of controlling the apparatus. The method of controlling the apparatus having an upper casing with an upper concave part therein, a lower casing with a lower concave part therein, a vacuum chamber formed by the close contact between the upper concave part and the lower concave part, such that an opening portion at one end of the plastic bag is inserted into the vacuum chamber, a vacuum pump for providing vacuum to the vacuum chamber, and a heater for heat sealing the plastic bag being in a vacuum state at the front portion thereof, including the steps of: descending the upper casing above the lower casing to thereby operate a first switch and a second switch together, the first switch and the second switch disposed protrudedly on the contact surface between the upper casing and the lower casing,

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being connected to a digital control unit; and operating the vacuum pump and the heater in a sequential order by the control of the digital control unit, such that the plastic bag is vacuumed in a plastic mode.



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APPARATUS FOR VACUUM PACKAGES AND  
METHOD OF CONTROLLING IT

**Technical Field**

5       The present invention relates to an apparatus for vacuum sealing a plastic bag and/or a container in which articles like food for storage are put in a vacuum state to thereby prevent the oxidization or decay of the articles and a method of controlling the apparatus, and more particularly, to an apparatus for vacuum sealing a plastic bag and/or a container wherein one of a plastic bag mode and a container mode is selected by just touching switches under the control of a digital control part, such that if the container mode is selected, only the container is vacuumed by connecting a hose to a suction inlet in a vacuum chamber, while the vacuum chamber is not being vacuumed, thereby preventing the air leakage in conventional vacuum sealing apparatuses.

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**Background Art**

Generally, articles like food for storage are packaged by plastic wrap or a vinyl bag and then placed in refrigerators. In this case, however, the articles stay good for a predetermined length of time, but as time is elapsed, they get oxidized and decayed by the air charged in the interior of the packaged container or vinyl bag.

20       To solve this problem, there have been developed various kinds of apparatuses for vacuum sealing the plastic bag from which air is eliminated.

As one of the prior arts, there is disclosed Korean Patent Application Publication No. 92-0700998 (entitled 'an apparatus for vacuum sealing plastic bags').

25       As shown in FIGS. 1a to 1c, in more detail, according to the conventional vacuum

sealing apparatus a switch 59 is manipulated to operate a vacuum pump 53 as a hood 33 is descended above a base 32, and after vacuuming, a vacuum display 56 is operated to permit a switch 68 to be manipulated by a user, which enables a heater 50 to operate. Thereby, the plastic bag is completely sealed. At that time, there 5 occurs a problem that ventilating means 67 (see FIG. 1c) that is opened normally should be continuous to be pressed by means of a button 66 (see FIGS. 1b and 1c) through the user during vacuum sealing, thereby making it inconvenient to use. In addition, in the conventional vacuum sealing apparatus the vacuum pump 53 and heater switches 59 and 60 are directly connected to a high voltage of power, such that 10 a liquid like soup flowing over the plastic bag and/or the container during vacuum sealing may make the switches short-circuited. This even may make the user get shocked. As shown in FIG. 1b, furthermore, in the conventional vacuum sealing apparatus the hood 33 is descended above the base 32, and the container is vacuumed through the vacuum chamber 34. Thus, the air charged unnecessarily in the interior 15 of the vacuum chamber 34 should be removed. Also, the ventilating means 67 that is opened normally should be kept to be pressed by the button 66 through the user during the vacuum sealing for the container.

To solve the afore-mentioned problems, there is disclosed Korean Utility Model Registration No. 20-0235323 (entitled 'Apparatus for vacuum sealing') by 20 one of the same inventors as the present invention, which is illustrated in FIG 2. As shown, the conventional vacuum sealing apparatus is set to a heater mode, a plastic bag mode, or a container mode by the manipulation of a menu switch 102 and the vacuum sealing is automatically carried out by the manipulation of a switch 108 in the set mode. However, there are some inconveniences that the mode should be set 25 by the user and the switch 108 should be also manipulated by the user. Moreover,

vacuum container suction means 64 is connected to a vacuum transferring groove 60 that is placed between the vacuum pump and the vacuum chamber, such that if the vacuum container suction means 64 is not fit well in the vacuum transferring groove 60, the air in the passage from the vacuum chamber to the vacuum pump may be 5 leaked, which causes the vacuum to be incompletely carried out. Also, the vacuum transferring groove 60 is exposed to the outside, and as time is elapsed, the dust or foreign materials are accumulated thereon, such that there is a problem that the dust or foreign materials are sucked to the vacuum pump through the vacuum container suction means 64 and a hose 72 placed on the vacuum transferring groove 60.

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#### Disclosure of Invention

Accordingly, the present invention has been made to solve the above-described problems, and it is an object of the present invention to provide an apparatus for vacuum sealing a plastic bag and/or a container and a method of 15 controlling the apparatus, wherein a plastic bag mode is set by pressing a first switch and a second switch together under the control of a digital control unit, such that the plastic bag is automatically sealed in a vacuum state, and a container mode is set by pressing only the second switch under the control of the digital control unit, such that the container is automatically sealed in the vacuum state, which makes it convenient 20 and safe to use.

It is another object of the present invention to provide an apparatus for vacuum sealing a plastic bag and/or a container and a method of controlling the apparatus, wherein a first switch and a second switch are pressed together as an upper casing is descended above a lower casing, such that the plastic bag is 25 automatically vacuumed by the control of a digital control unit.

It is yet another object of the present invention to provide an apparatus for vacuum sealing a plastic bag and/or a container and a method of controlling the apparatus, wherein vacuum sealing halts automatically as an upper casing gets opened in a plastic bag mode and as a second switch is pressed again in a container mode.

It is still another object of the present invention to provide an apparatus for vacuum sealing a plastic bag and/or a container and a method of controlling the apparatus, wherein a vacuum pump and a heater are operated together for a predetermined length of time in a plastic bag mode, thereby greatly improving a degree of vacuum.

It is yet still another object of the present invention to provide an apparatus for vacuum sealing a plastic bag and/or a container and a method of controlling the apparatus, wherein a vacuum chamber does not need to be vacuumed in a container mode, while solving the leakage of air in the conventional vacuum sealing apparatus.

It is yet another object of the present invention to provide an apparatus for vacuum sealing a plastic bag and/or a container and a method of controlling the apparatus, wherein vacuum sealing is carried out by simply touching a switch, removing an inconvenience that a vacuum releasing valve or a second switch should be kept to be pressed during the vacuum sealing.

To achieve these and other objects, according to the present invention, there is provided a method of controlling an apparatus for vacuum sealing a plastic bag and/or a container, the apparatus having an upper casing with an upper concave part therein, a lower casing with a lower concave part therein, a vacuum chamber formed by the close contact between the upper concave part and the lower concave part, such that an opening portion at one end of the plastic bag is inserted into the vacuum

chamber, a vacuum pump for providing vacuum to the vacuum chamber, and a heater for heat sealing the plastic bag being in a vacuum state at the front portion thereof, the method including the steps of: descending the upper casing above the lower casing to thereby operate a first switch and a second switch together that are disposed 5. protrudedly on the contact surface between the upper casing and the lower casing, being connected to a digital control unit; and operating the vacuum pump and the heater in a sequential order by the control of the digital control unit, such that the plastic bag is vacuumed in a plastic bag mode.

According to the present invention, the first switch and the second switch are 10 all operated as the upper casing is descended above the lower casing, such that the apparatus becomes in the plastic bag mode under the control of the digital control unit, and the plastic bag is automatically vacuumed by simply touching the switches. Also, according to the present invention, a hose is connected to a suction inlet in the 15 vacuum chamber, such that the vacuum chamber does not need to be vacuumed in a container mode, which enables a leakage problem suffered in the conventional apparatuses to be clearly solved. Furthermore, the installation of the digital control unit and the vacuum releasing valve that stays closed in a normal state completely removes the inconvenience that the vacuum releasing valve or the second switch should be kept to be pressed during the vacuum sealing.

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#### Brief Description of the Drawings

Further objects and advantages of the invention can be more fully understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

25 FIG. 1a is a perspective view of a conventional vacuum sealing apparatus,

wherein a plastic bag is vacuumed;

FIG. 1b is a perspective view of the conventional vacuum sealing apparatus,  
wherein a container is vacuumed;

FIG. 1c is a circuit diagram of the conventional vacuum sealing apparatus;

5 FIG. 2 is a perspective view of another conventional vacuum sealing  
apparatus;

FIG. 3a is a perspective view of a vacuum sealing apparatus according to the  
present invention, wherein the apparatus is being in a closed state;

FIG. 3b is a sectional view taken along the line A-A of FIG. 3a;

10 FIG. 4 is a perspective view of the vacuum sealing apparatus according to  
the present invention, wherein the apparatus is being in an opened state;

FIG. 5 is a perspective view of the vacuum sealing apparatus according to  
the present invention, wherein a container is being in a vacuumed state;

15 FIG. 6 is a perspective view of a hose assembly used in the vacuum sealing  
apparatus of the present invention;

FIG. 7 is a block diagram of controlling the vacuum sealing apparatus of the  
present invention;

FIG. 8a is a flowchart showing the control of the vacuum sealing apparatus  
of the present invention;

20 FIG. 8b is a flowchart showing the control in a plastic bag mode; and

FIG. 8c is a flowchart showing the control in a container mode.

### Best mode for Carrying Out the Invention

Now, an explanation of the preferred embodiments of the present invention  
25 will be in detail given with reference to attached drawings. FIGS. 3a to 8b show the

preferred embodiments of a vacuum sealing apparatus 100 and a method according to the present invention. First of all, an explanation of the vacuum sealing apparatus 100 will be in detail given.

As shown in FIGS. 3a and 4, the vacuum sealing apparatus 100 includes an upper casing 200, a lower casing 300, a vacuum chamber 400, a vacuum pump 500, a heater 600, a hose assembly 700 and a digital control unit 800. Thereby, a plastic bag or a container 901 is vacuumed by means of the vacuum sealing apparatus 100. In some cases, the vacuum sealing apparatus can be manufactured only for the purpose of the plastic bag, and desirably, the vacuum pump 500, the heater 600 and the digital control unit 800 are housed in the lower casing 300. The upper casing 200 is pivoted by the lower casing 300 in such a manner as to be opened and closed. In more detail, in a plastic bag mode where the plastic bag is vacuumed, the opening portion at one end of the plastic bag (which is not shown in the drawing) is inserted into the vacuum chamber 400, and after that, the upper casing 200 is descended above the lower casing 300, such that the vacuum pump 500 and the heater 600 are sequentially operated by the control of the digital control unit 800 in an automatic one touch type, thereby completing the vacuum sealing for the plastic bag. On the other hand, in a container mode where the container 901, as shown in FIG. 5, is vacuumed, the hose assembly 700 is connected between the suction inlet 420 in the vacuum chamber 400 and the vacuum valve of the container 901, such that the vacuum pump 500 is operated by the control of the digital control unit 800 as a second switch 811 as will be discussed later is simply pressed, thereby completing the vacuum sealing for the container 901. Hereinafter, an explanation of the parts in the vacuum sealing apparatus of the present invention will be in detail given.

As shown in FIGS. 3a and 4, the upper casing 200 is hingeably mounted on

the lower casing 300 in such a manner as to be opened and closed. The upper concave part 230 is formed on the bottom surface of the upper casing 200, and desirably, an elastic upper pad 231 is provided to surround the periphery of the upper concave part 230, such that when the upper casing 200 is descended above the lower 5 casing 300, the upper concave part 230 is engaged with the lower concave part 330 of the lower casing 300, thereby forming the vacuum chamber 400 therein.

As shown in FIGS. 3a and 3b, the vacuum releasing valve 210 is formed on the top surface of the upper casing 200, and normally, the vacuum chamber 400 (see FIG 4) is not in communication with the air. However, when the vacuum releasing 10 valve 210 is pressed, the vacuum chamber 400 gets in communication with the air, thereby making the vacuum in the vacuum chamber 400 released, such that the upper casing 200 can be easily opened. This gets rids of the inconvenience that in the plastic bag mode the vacuum releasing valve 210 should be kept to be pressed during the vacuum sealing. As shown in FIG 3b, for example, the vacuum releasing valve 15 210 includes a hole 214 located on the upper concave part 230, a protrusion 215 for opening/closing the hole 214, a button 211 for moving up the protrusion 215 to thereby open the hole 214, and a spring 213 for moving down the protrusion 215 to thereby return the protrusion 215 to its original closed position for the hole 214. Otherwise, the vacuum releasing valve 210 may be various kinds of mechanical or 20 electromagnetic switch valves.

As the upper casing 200 is descended above the lower casing 300, a contact surface 203 (see FIG. 4) comes in contact with the contact surface 302 of the lower casing 300 on which a first switch 810 and a second switch 811 are positioned, such that the first and second switches 810 and 811 are pressed together. An explanation 25 of the first and second switches 810 and 811 will be in detail given with reference to

the digital control unit 800 as will be described later.

As shown in FIGS. 4 and 5, the lower casing 300 houses all kinds of vacuum pumps 500 (see FIG. 7), the heater 600 (see FIG. 7), and the digital control unit 800 (see FIG. 7) therein. In some cases, they may be housed in the upper casing 200.

- 5 And, the lower concave part 330 is formed on the top surface of the lower casing 300, and desirably, an elastic lower pad 331 is provided to surround the periphery of the lower concave part 330. Thus, when the upper casing 200 is descended above the lower casing 300, the lower concave part 330 is engaged with the upper concave part 230 of the upper casing 200, thereby forming the vacuum chamber 400 therein.
- 10 Desirably, the lower concave part 330 is separable from the lower casing 300 and is substantially high in depth, having a substantially large rounding angle at the corners, so that the liquid or powder material generally flowing over the plastic bag during the vacuum sealing is accumulated in the vacuum chamber 400, not entering the vacuum pump 500. This also enables the lower concave part 300 to be easily
- 15 cleaned.

- The lower casing 300 is provided with the first switch 810 and the second switch 811 that are protruded on the left and right sides on the contact surface 302, operated when the upper casing 200 is descended above the lower casing 300. The lower casing 300 is further provided with a three-color LED lamp 310 (see FIG. 3a)
- 20 that is located on the rear top end thereof and is electrically connected to the digital control unit 800. For example, the three-color LED lamp 310 is the lamp where each of a green LED and a red LED is formed and with the combination of the green LED and the red LED, green, red and orange colors are displayed. The LED lamp 310 emits the green, orange and red colors to indicate the preparation state and the
  - 25 operation states of the vacuum pump 500 and the heater 600.

As shown in FIGS. 4, 5 and 6, the vacuum chamber 400 is formed by the tight contact between the upper concave part 230 of the upper casing 200 and the lower concave part 330 of the lower casing 300. At that time, the front of the opening portion of the plastic bag is inserted into the vacuum chamber 400 and the 5 interior air of the plastic bag is discharged as the vacuum chamber 400 is vacuumed. In some cases, the vacuum chamber 400 may be formed by the plane that replaces the upper concave part 230 of the upper casing 200 and by the lower concave part 330 of the lower casing 300. As shown in FIGS. 4 and 5, the suction inlet 420 is located in the vacuum chamber 400, for example, in the lower concave part 330 and 10 is directly connected to the vacuum pump 500 through a hose (now shown), without having any vacuum transferring groove 60 (see FIG. 2) of the conventional vacuum sealing apparatus, thereby allowing the vacuum chamber 400 to be vacuumed. In the state where the upper casing 200 is opened, as shown in FIG. 5, the suction inlet 420 is connected to the hose assembly 700, such that the container 901 is just 15 vacuumed, while the air in the vacuum chamber 400 is not being discharged.

As shown in FIG. 6, on the other hand, the hose assembly 700 is provided with a hose 701 and two connecting elements 702 mounted on the both ends of the hose 701, for connecting the suction inlet 420 of the vacuum chamber 400 with the container 901, thereby allowing the container 901 to be vacuumed. The hose 701 is 20 preferably made of a transparent flexible plastic material, and each of the connecting elements 702 is a stepped pipe type and is made of a relatively hard plastic material, which makes it easy to be detachably mounted on the suction inlet 420 and the container 901. Of course, it is possible that the suction inlet 420 is connected with the container only by means of the hose 701, without having the connecting elements 25 702.

As shown in FIG. 4, the heater 600 is desirably formed of a heat wire electrically heated and is located on the front of the lower concave part 330 on the top surface of the lower casing 300. The heater 600 is coupled to a pad 602 on the upper casing 200, and after completing the vacuum sealing procedure, it is driven by 5 the control of the digital control unit 800 to thereby heat and seal the front portion of the plastic bag. And, the vacuum pump 500 (see FIG. 7) is desirably housed in the lower casing 300 and driven by the digital control unit 800.

As shown in FIG. 5, in the container mode the hose assembly 700 is connected to the valve on the container 901 at one end thereof and to the suction inlet 10 420 in the lower concave part 330 through the hose 701 at the other end thereof and the second switch 811 is manipulated, with the help of a user, thereby allowing the container 901 to be vacuumed.

According to the vacuum sealing apparatus of the present invention, in the plastic bag mode the vacuum pump 500 and the heater 600 are sequentially operated 15 under the control of the digital control unit 800 by simply pressing the first and second switches 810 and 811, thereby enabling the plastic bag to be vacuumed, and in the container mode the vacuum pump 500 is operated under the control of the digital control unit 800 by simply pressing the second switch 811, thereby enabling the container 901 to be vacuumed. Now, an explanation of a method of controlling 20 the vacuum sealing apparatus 100 of the present invention will be in detail given.

FIG. 7 is a block diagram showing all kinds of parts of the vacuum sealing apparatus 100 electrically connected to one another and FIG. 8 is a flowchart showing the control procedure of the vacuum sealing apparatus 100.

The digital control unit 800 is housed in the upper casing 200 or the lower 25 casing 300, and receives the state information of the first switch 810, the second

switch 811, a temperature switch 820, and a pressure switch 821 and transmits output signals to the vacuum pump 500, the heater 600, and the three-color LED lamp 310. The digital control unit 800 includes a memory in which an operation determiner, programs and data are stored, a timer, and a micro controller or IC chip having 5 input/output ports, such that it controls the vacuum sealing apparatus 100 in a safe manner in substantially small power through the signals indicating all state information. In more detail, even though the liquid like soup flows over the plastic bag during the vacuum sealing in the state where the sealing material for the first switch 810 and the second switch 811 is worn due to the repeated contact between 10 the upper casing 200 and the lower casing 300, the trouble like electric shock or electric leakage can be completely avoided.

A power source 830 is employed with batteries or alternating current power for domestic use that is rectified by a transformer 831 and a rectifying circuit (not shown). A thermal fuse 832 for the transformer use and a thermal fuse 833 for the 15 heater use are located on the transformer 831 and the heater 600 and are connected to the power source 830. The supply of the power source 830 stops when the thermal fuses 832 and 833 overheat.

The first switch 810 is formed in such a manner as to be protruded on the contact surface 203 of the upper casing 200 or on the contact surface 302 of the 20 lower casing 300, and as the upper casing 200 is descended above the lower casing 300, it is automatically operated. Otherwise, after the upper casing 200 is opened, it is manipulated by the user to thereby make the apparatus set to the plastic bag mode or the container mode. Then, the signal for the set mode is transmitted to the digital control unit 800, thereby making the vacuum pump 500 or the heater 600 operated. 25 The first switch 810 and the second switch 811 may have various mechanical

configurations, and they can be turned on and off by means of the protruded portion on the upper casing 200.

The temperature switch 820 is located on the transformer 831 and if a predetermined temperature or more is reached, it is turned on (or off). The 5 temperature switch 820 includes a bimetal, a thermistor, and so on. The signal of the temperature switch 820 is transmitted to the digital control unit 800 to thereby stop operating the vacuum pump 500 and the heater 600, and the digital control unit 800 starts to an initial preparation state at a step 840 (see FIG. 8a), thereby improving the safety of the vacuum sealing apparatus 100.

10 The pressure switch 821 is located on the hose (not shown) connecting the vacuum pump 500 and the suction inlet 420, and if a predetermined degree of vacuum or more is reached, it is turned on (or off). The pressure switch 821 includes a strain gage, a piezoelectric element, and so on. The signal of the pressure switch 821 is transmitted to the digital control unit 800 to thereby stop 15 operating the vacuum pump 500 or determine whether the vacuum is completed.

The vacuum pump 500 is housed in the lower casing 300 and is operated by driving, for example, a DC motor by the control of the digital control unit 800.

The heater 600 is located on the surface of the upper casing 200 or the lower casing 300, operated by the control of the digital control unit 800.

20 The three-color LED lamp 310 is the lamp on which the green LED and the red LED are formed and with the combination of the green LED and the red LED, green, red and orange colors are displayed. The three-color LED lamp 310 is located on the rear top end of the lower casing 300 and is electrically connected to the digital control unit 800. The LED lamp 310 emits the green, orange and red 25 colors to indicate the preparation state and the operation states of the vacuum pump

500 and the heater 600.

The digital control unit 800 controls the vacuum sealing apparatus 100 in each of the plastic bag mode where the plastic bag is vacuumed and the container mode where the container 901 is vacuumed. The control procedure for the vacuum 5 sealing apparatus 100 of the present invention will be described with reference to FIGS. 8a to 8c.

If an initial power source is supplied, as shown in FIG. 8a, at the step 840 the digital control unit 800 enters the initial preparation step where the operation of the vacuum pump 500 and the heater 600 stops and the three-color LED lamp 310 emits 10 the green color light.

If the first and second switches 810 and 811 are operated together, for a predetermined length of time, the initial preparation step 840 enters a step 850 of setting the plastic bag mode. If only the second switch 811 is operated for the predetermined length of time, the initial preparation step 840 enters a step 860 of 15 setting the container mode.

First, an explanation of the step 850 of setting the plastic bag mode will be given.

At a step 851 of operating the vacuum pump, the vacuum pump 500 is operated under the control of the digital control unit 800, and thereby, vacuum is 20 provided in the vacuum chamber 400. The plastic bag is vacuumed through the vacuum chamber 400. At this time, the three-color LED lamp 310 displays the orange color.

At a step 852, it is determined whether the plastic bag is vacuumed at a prescribed degree through the signal from the pressure switch 821 under the control 25 of the digital control unit 800. If the prescribed degree of vacuum is not reached,

the step 852 is returned to the step 851, and if so, it enters a step 854 of operating the heater 600.

At the step 854, a power source is applied for a predetermined length of time, for example, for 4 seconds to the heater 600 under the control of the digital control unit 800, and thus, the plastic bag is heat sealed. At this time, the three-color LED lamp 310 displays the red color.

In some cases, if the vacuum is completed at the step 852, a step 853 where the vacuum pump 500 and the heater 600 are operated together is added. Thereafter, the step 853 enters the step 854. In more detail, the vacuum pump 500 is operated together with the heater 600 for the predetermined length of time, for example, for 4 seconds during which the plastic bag is heat sealed. In this case, the degree of vacuum of the plastic bag is substantially reliable and improved.

After the heater operating step 854 is finished, it is returned to a step 855 of returning to the initial preparation step 840. Thus, the digital control unit 800 is at the initial preparation step 840.

FIG 8b shows the control in the plastic bag mode, wherein the vacuum pump 500 and the heater 600 halt because they are interrupted by the first switch 810, the second switch 811 and the temperature switch 820, and thus, the steps 851, 853 and 854 are returned to the initial preparation step 840.

At a step 870, a temperature interrupt occurs when the transformer 831 is over the predetermined temperature at the step 851 where the vacuum pump 500 is operated, the step 854 where the heater 600 is operated and the step 853 where the vacuum pump 500 and the heater 600 are operated together. At this time, the temperature switch 820 is operated to transmit the output signal to the digital control unit 800, such that the steps are returned to the initial preparation step 840 where the

vacuum pump 500 and the heater 600 halt, thereby preventing overheating the vacuum sealing apparatus 100. And, the temperature interrupt is checked at any time at the steps 851, 854 and 853, and if the temperature switch 820 is not operated, the step 870 enters a plastic bag interrupt step 880.

- 5 At the step 880, the plastic bag interrupt occurs when the upper casing 200 is opened to cause the first switch 810 or the second switch 811 to be turned off for a predetermined length of time (for example, for 0.5 seconds). At this time, the vacuum pump 500 and the heater 600 halt by the control of the digital control unit 800, and the plastic bag interrupt step 880 is returned to the initial preparation step  
10 840. If the plastic bag interrupt does not occur, the steps 851, 854 and 853 are carried out.

Next, an explanation of a step 860 of setting the container mode is given with reference to FIG. 8a.

- If the container mode is set at the step 860, the vacuum pump 500 is  
15 operated by the control of the digital control unit 800 such that the container 901 is vacuumed, at a step 861. At this time, before this step the suction inlet 420 and the container 901 should be connected to each other by the use of the hose assembly 700 through the user. In this case, the three-color LED lamp displays the orange color.

- At a step 862, it is determined whether the container is vacuumed at a  
20 prescribed degree through the signal from the pressure switch 821 under the control of the digital control unit 800. If the prescribed degree of vacuum is not reached, the step 862 is returned to the step 851, and if so, it enters a step 863 of returning to the initial preparation step 840.

Thus, the digital control unit 800 is at the initial preparation step 840.

- 25 FIG. 8c shows the control in the container mode, wherein the vacuum pump

500 and the heater 600 halt because they are interrupted by the second switch 811 and the temperature switch 820, and thus, the step 861 where the vacuum pump 500 is operated is returned to the initial preparation step 840.

At the step 870, the temperature interrupt occurs when the transformer 831 is 5 over the predetermined temperature at the step 861. At this time, the temperature switch 820 is operated to transmit the output signal to the digital control unit 800, such that the step 861 is returned to the initial preparation step 840 where the vacuum pump 500 and the heater 600 halt, thereby preventing overheating the vacuum sealing apparatus 100. And, the temperature interrupt is checked at any time at the 10 step 861, and if the temperature switch 820 is not operated, the step 870 enters a container interrupt step 890.

At this step 890, the container interrupt occurs when the second switch 811 is turned on again for a predetermined length of time (for example, for 0.25 seconds). At this time, the vacuum pump 500 and the heater 600 halt by the control of the 15 digital control unit 800, and the container interrupt step 890 is returned to the initial preparation step 840. If the container interrupt does not occur, the step 861 is carried out.

If the vacuum sealing apparatus 100 is not in use, it stays at a stand-by state at the initial preparation step 840 where the vacuum pump 500 and the heater 600 20 halt by the control of the digital control unit 800.

#### **Industrial applicability**

As set forth in the foregoing, there is provided a vacuum sealing apparatus and a method of controlling the vacuum sealing apparatus, wherein a plastic bag 25 mode is set by pressing a first switch and a second switch together under the control

of a digital control unit, such that the plastic bag is automatically sealed in a vacuum state, and a container mode is set by pressing only the second switch under the control of the digital control unit, such that the container is automatically sealed in the vacuum state, which makes it convenient and safe to use.

5       The first switch and the second switch are operated together as an upper casing is descended above a lower casing, such that the plastic bag is automatically vacuumed by the digital control unit, and there is a vacuum releasing valve that is opened normally, such that there is no need for manipulating the upper casing or the switch during the vacuum sealing.

10      In the container mode, there is no need for providing the vacuum to the vacuum chamber, and also, there is no vacuum transferring groove, thereby solving the conventional problem that air is leaked.

With a three-color LED lamp, in addition, various operation states of the vacuum sealing apparatus of the present invention are displayed with a few colors.

15      In the plastic bag mode, the vacuum halts when the upper casing is opened, and in the container mode, it halts when the second switch is pressed again, thereby making it safe and convenient to use.

In the plastic bag mode, the vacuum pump and the heater are operated together for a predetermined length of time, thereby enhancing a degree of vacuum.

20      The installation of a temperature switch prevents the vacuum sealing apparatus of the present invention from being overheated.

While the present invention has been described with reference to a few specific embodiments, the description is illustrative of the invention and is not to be construed as limiting the invention. Various modifications may occur to those skilled in the art without departing from the true spirit and scope of the invention as

defined by the appended claims.

What Is Claimed Is:

1. A method of controlling an apparatus for vacuum sealing a plastic bag and/or a container, the apparatus having an upper casing with an upper concave part 5 therein, a lower casing with a lower concave part therein, a vacuum chamber formed by the close contact between the upper concave part and the lower concave part, such that an opening portion at one end of the plastic bag is inserted into the vacuum chamber, a vacuum pump for providing vacuum to the vacuum chamber, and a heater for heat sealing the plastic bag being in a vacuum state at the front portion thereof, the 10 method comprising the steps of:

descending the upper casing above the lower casing to thereby operate a first switch and a second switch together, the first switch and the second switch disposed protrudedly on the contact surface between the upper casing and the lower casing, being connected to a digital control unit; and

15 operating the vacuum pump and the heater in a sequential order by the control of the digital control unit, such that the plastic bag is vacuumed in a plastic bag mode.

2. The method as defined in claim 1, wherein the apparatus comprises a 20 suction inlet placed in the upper concave part or the lower concave part in such a manner as to be directly connected to the vacuum pump and a hose detachably mounted on the suction inlet at one end thereof and detachably mounted on the container at the other end thereof, and when only the second switch is operated, the vacuum pump is just operated by the control of the digital control unit such that the 25 container is vacuumed in the container mode.

3. The method as defined in claim 2, wherein the plastic bag mode comprises the steps of:

if the first switch and the second switch are operated together, entering a step  
5 of setting the plastic bag mode at an initial preparation step by the control of the digital control unit;

operating the vacuum pump by the control of the digital control unit, thereby providing the vacuum to the vacuum chamber;

determining whether the vacuum chamber is vacuumed at a predetermined  
10 degree by the control of the digital control unit, and returning to the step of operating the vacuum pump if the predetermined degree of vacuum is not reached, but entering a step of operating the heater if the predetermined degree of vacuum is reached;

operating the heater by the control of the digital control unit and sealing the plastic bag; and

15 after sealing the plastic bag, returning to the initial preparation step, and the container mode comprises the steps of:

if only the second switch is operated, entering a step of setting the container mode at the initial preparation step by the control of the digital control unit;

operating the vacuum pump by the control of the digital control unit and  
20 providing the vacuum to the container by use of the hose and the suction inlet connected to the vacuum pump;

determining whether the container is vacuumed at a predetermined degree by the control of the digital control unit, and returning to the step of operating vacuum pump if the predetermined degree of vacuum is not reached, but entering a step of  
25 returning to the initial preparation step if the predetermined degree of vacuum is

reached; and

after vacuuming the container, returning to the initial preparation step.

4. The method as defined in claim 3, wherein if the first switch or the second  
5 switch is turned off in the plastic bag mode, the steps of operating the vacuum pump,  
the heater, and both of the vacuum pump and the heater are returned to the initial  
preparation step, and if the second switch is turned on again in the container mode,  
the step of operating the vacuum pump is returned to the initial preparation step.
  
- 10 5. The method as defined in claim 4, wherein if it is determined that the  
predetermined degree of vacuum is reached, a step of operating the vacuum pump  
and the heater together is added and after the step, the step of operating the heater is  
carried out.
  
- 15 6. The method as defined in any one of claims 1 to 5, wherein the  
predetermined degree of vacuum in the plastic bag mode and the container mode is  
measured by a pressure switch that is coupled to the hose connected to the vacuum  
pump and transmits an output signal to the digital control unit.
  
- 20 7. The method as defined in any one of claims 1 to 5, wherein a temperature  
switch is mounted on a power source transformer, the temperature switch  
transmitting an output signal to the digital control unit, and if the temperature switch  
is operated in the plastic bag mode and the container mode, the step of returning to  
the initial preparation step is carried out by the control of the digital control unit.

8. An apparatus for vacuum sealing a plastic bag and/or a container that has an upper casing with an upper concave part therein, a lower casing with a lower concave part therein, a vacuum chamber formed by the close contact between the upper concave part and the lower concave part, such that an opening portion at one end of the plastic bag is inserted into the vacuum chamber, a vacuum chamber for providing vacuum to the vacuum chamber, and a heater for heat sealing the plastic bag being in a vacuum state at the front portion thereof, the apparatus comprising:

a suction inlet placed in the upper concave part or the lower concave part, the suction inlet directly connected to the vacuum pump; and

10 a hose detachably mounted on the suction inlet at one end thereof and detachably mounted on the container at the other end thereof.

9. The apparatus as defined in claim 8, wherein a vacuum releasing valve for the vacuum chamber is closed normally and if pressed, it is opened such that the 15 vacuum in the vacuum chamber is released, the vacuum releasing valve being located on the upper casing.

10. The apparatus as defined in claim 8 or 9, further comprising:

20 a first switch protruded on the contact surface between the upper casing and the lower casing, the first switch being connected to the digital control unit;

a second switch protruded on the contact surface between the upper casing and the lower casing, the second switch being connected to the digital control unit;

the vacuum pump driven by a motor connected to the digital control unit;

the heater connected to the digital control unit and operated; and

25 the digital control unit for setting the plastic bag mode to operate the vacuum

pump until a predetermined degree of vacuum is reached in the vacuum chamber and driving the heater, if the first switch and the second switch are operated together, and for setting the container mode to operate the vacuum pump, if only the second switch is operated.

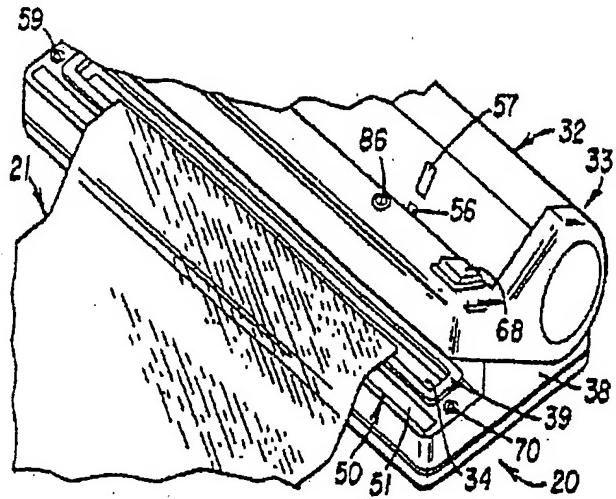
5

11. The apparatus as defined in claim 10, further comprising a three-color LED lamp connected to the digital control unit, displaying different colors at the time of an initial preparation, the operation state of the vacuum pump, and the operation state of the heater.

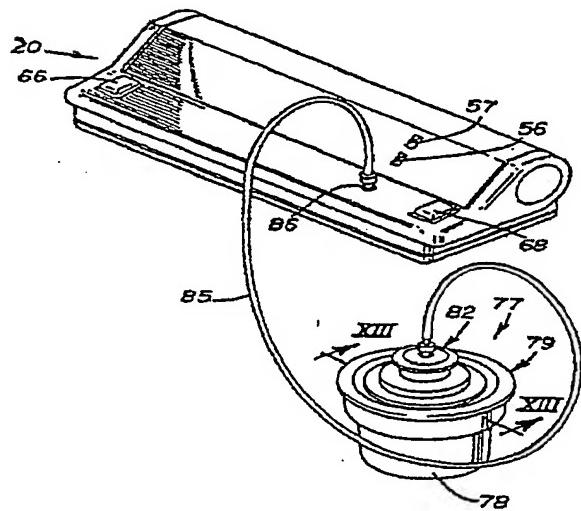
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## [DRAWING]

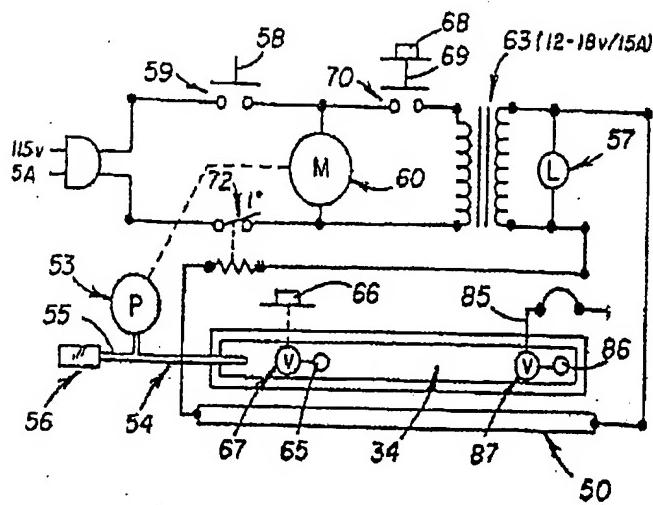
[FIG. 1a]



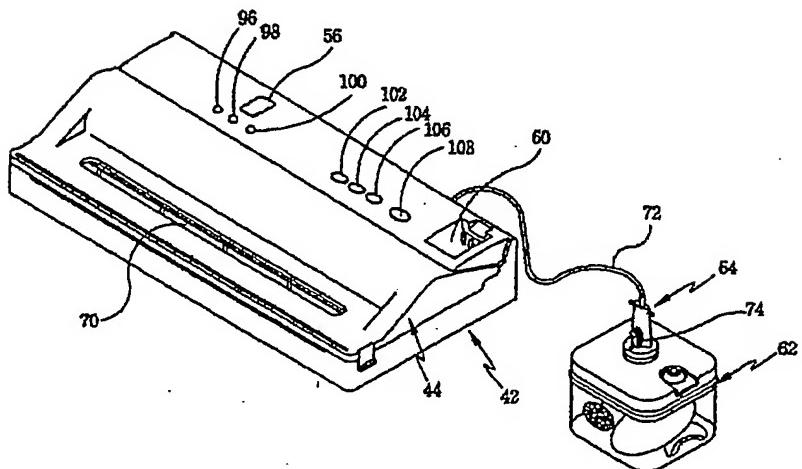
[FIG. 1b]



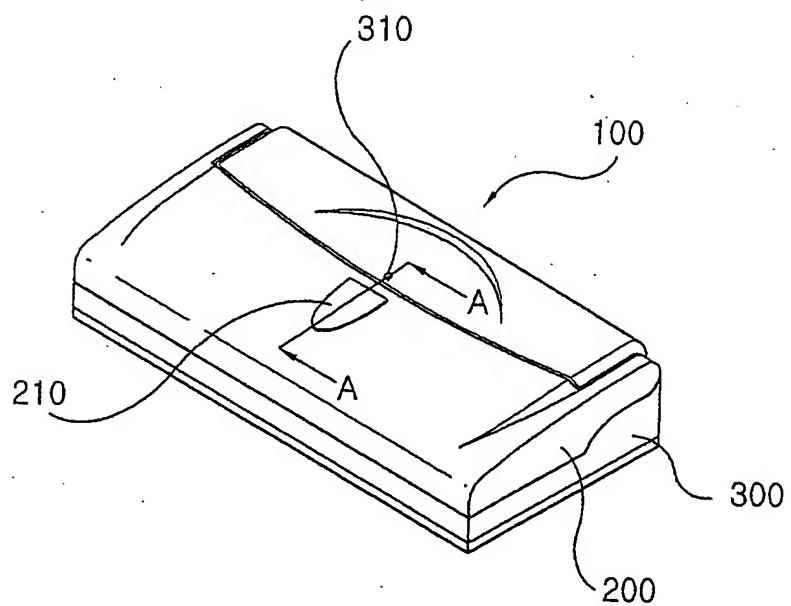
[FIG. 1c]



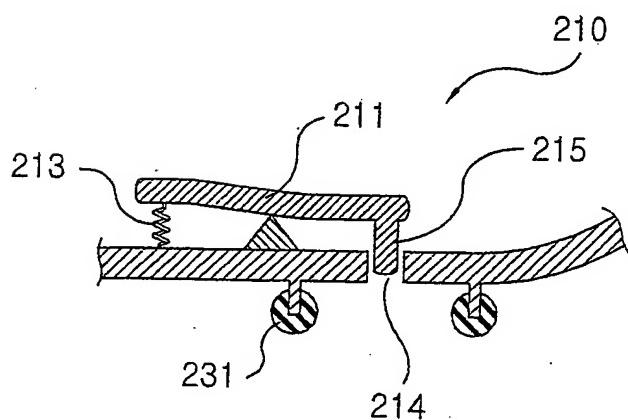
[FIG. 2]



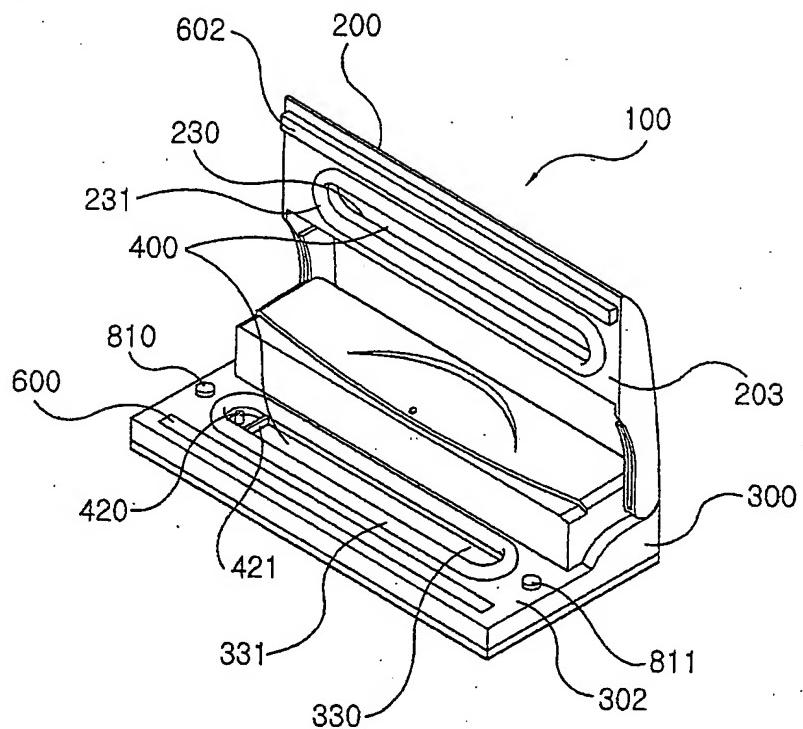
[FIG. 3a]



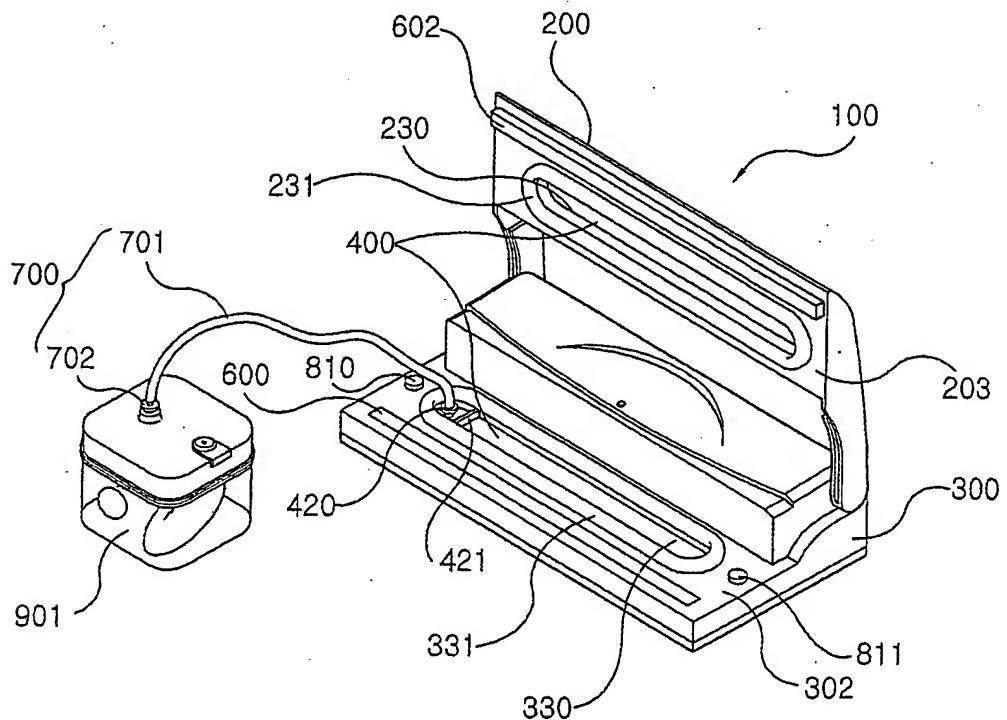
[FIG. 3b]



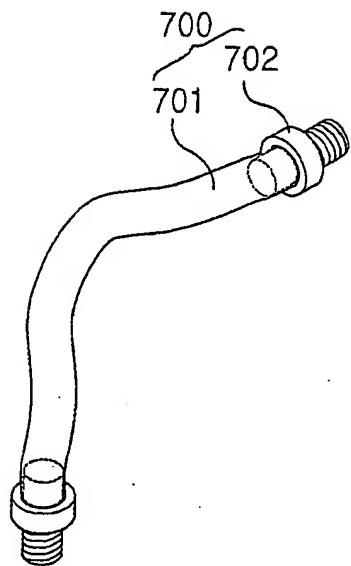
[FIG. 4]



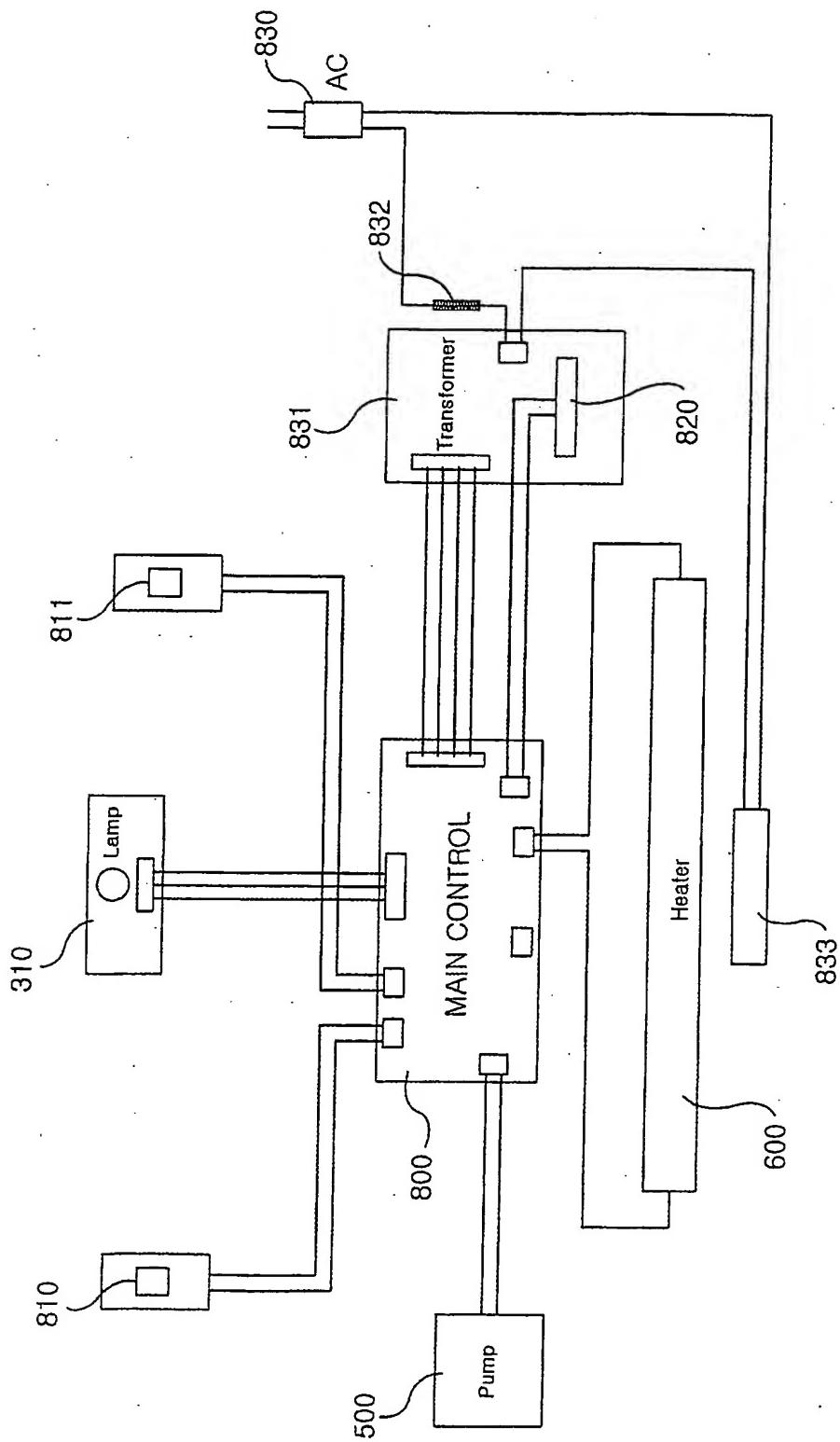
[FIG. 5]



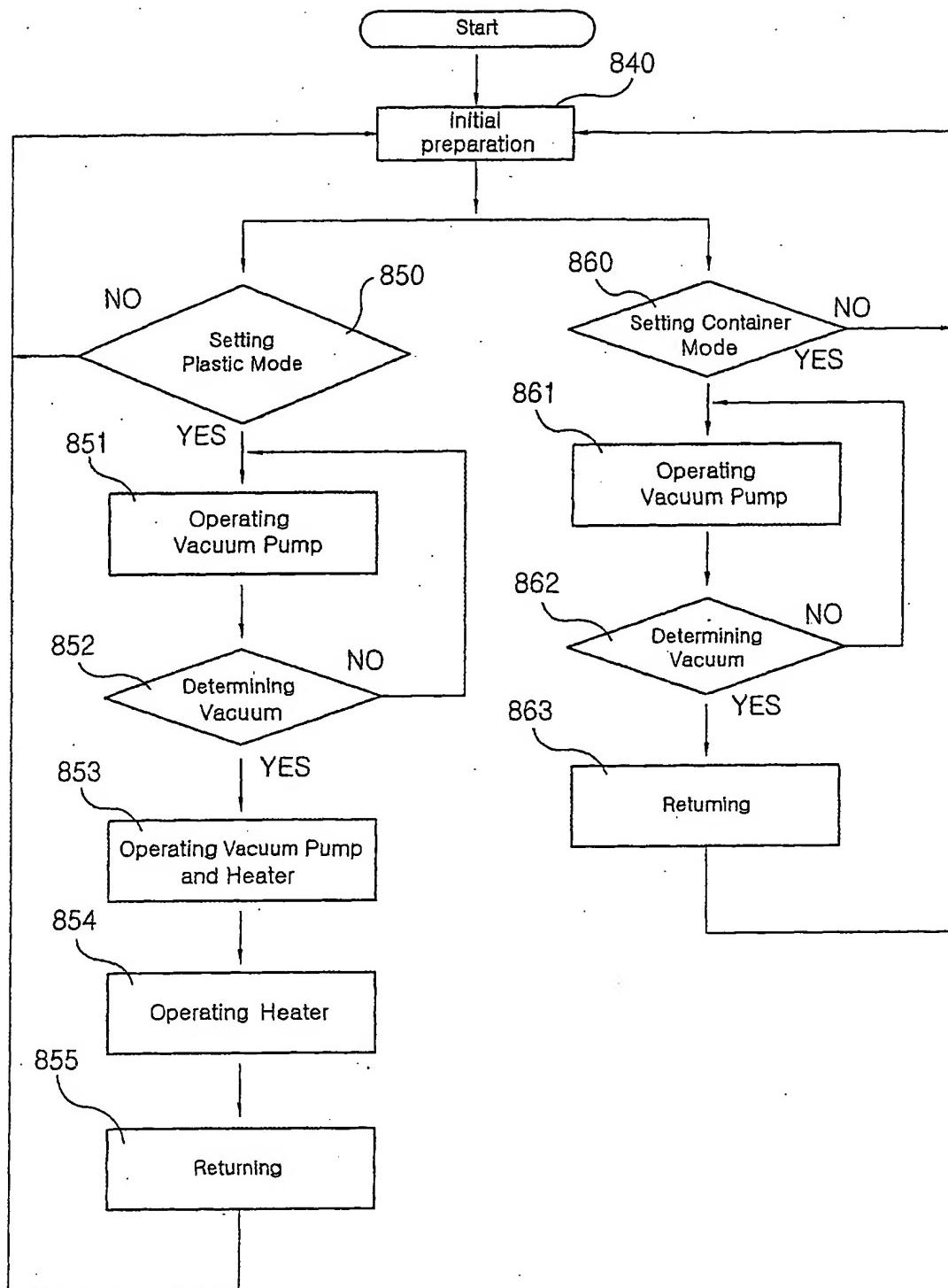
[FIG. 6]



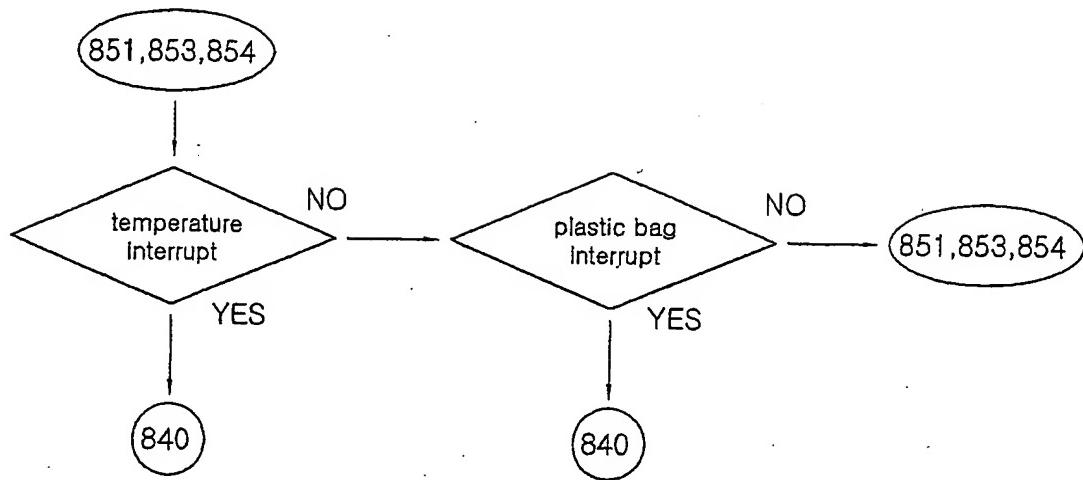
[FIG. 7]



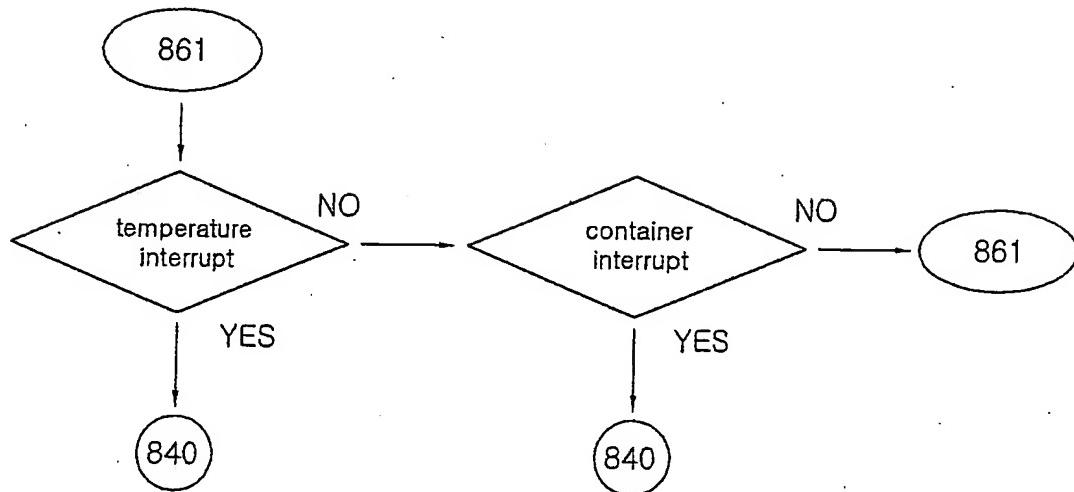
[FIG. 8a]



[FIG. 8b]



[FIG. 8c]



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2003/002554

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7 B65B 31/02

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7 B65B 31/00, B65B 31/02

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5,893,822 A (Keystone Mfg. Co., Inc.) 13 April 1999 see entire document	1, 8
A	WO 00/61437 (TILIA INCOPERATED) 19 October 2000 see entire document	1, 8

 Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:	
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"E"	earlier application or patent but published on or after the international filing date
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"O"	document referring to an oral disclosure, use, exhibition or other means
"P"	document published prior to the international filing date but later than the priority date claimed
"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&"	document member of the same patent family

Date of the actual completion of the international search  26 FEBRUARY 2004 (26.02.2004)	Date of mailing of the international search report  26 FEBRUARY 2004 (26.02.2004)
Name and mailing address of the ISA/KR   Korean Intellectual Property Office 920 Dunsan-dong, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer  PARK, Kyun Sung Telephone No. 82-42-481-5461

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

PCT/KR2003/002554

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5,893,822 A	13.04.1999	None	
WO 00/61437	19.10.2000	US 6,256,968 BA AU 200,042,424 A5 EP 1,177,132 A4	10.07.2001 14.11.2000 31.07.2002